

Review

Chronic Pancreatitis Research in India: A Scientometric Assessment of Publications during 2007-16Gupta BM¹, Bansal M^{2*}, Visakhi P³¹Formely with CSIR- NISTADS, New Delhi² Panjab University, Department of Mathematics Library, Chandigarh 160014, India³ Indian Institute of Science Education and Research (IISER) Mohali, Mohali 140306, Punjab, India

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Abstract

The present study examined 424 Indian chronic pancreatitis research publications, as indexed in Scopus database during 2007-16, with a view to understand their growth rate, global share, citation impact, international collaborative papers share, distribution of publications by broad subjects, productivity and citation profile of top organizations and authors, preferred media of communication and characteristics of high cited papers. The Indian publications registered an annual average growth rate of 8.73%, global share of 5.48%, international collaborative publications share of 13.68% and its citation impact averaged to 11.06 citations per paper. Medicine, among broad subjects, contributed the largest publications share of 92.45% in India's chronic pancreatitis research output, followed by biochemistry, genetics & molecular biology (27.83%) and pharmacology, toxicology & pharmaceuticals (2.83%) during 2007-16. Among various organizations and authors contributing to India's chronic pancreatitis research, the top 20 organizations and authors together contributed 80.42% and 81.84% respectively as their share of Indian publication output and more than 100% each respectively as their share of Indian citation output during 2007-16. Among 415 journal papers in Indian chronic pancreatitis research, the top 15 journals registered 49.67% share during 2007-16, which showed decrease from 55.56% to 45.84% from 2007-11 and 2012-16. There were only top 9 highly cited publications, which registered citations from 112 to 268 during 2007-16 and they together received 1414 citations, which averaged to 1157.11 citations per paper.

Keywords: Chronic pancreatitis; Pancreas; Indian publications; Scientometrics; Bibliometrics

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1. Introduction

The pancreas is an organ located in the abdomen. It plays an essential role in converting the food we eat into fuel for the body's cells. The pancreas has two main functions: an exocrine function that helps in digestion and an endocrine function that regulates blood sugar [1].

Pancreatitis means inflammation of the pancreas. There are two types: (i) Acute pancreatitis and (ii) Chronic pancreatitis. In acute pancreatitis, the inflammation develops quickly, over a few days or so. It usually goes away completely and leaves no permanent damage to the pancreas. In contrast, in chronic pancreatitis, the inflammation is persistent and ongoing over time and it can cause scarring and damage to parts of the pancreas. This can then lead to not enough chemicals (enzymes) and insulin being made, which causes poor digestion of food and diabetes. Also the clumps of calcium are deposited and can form stones in the pancreas over time. Calcium stones and/or scarring of the pancreatic tubes (ducts) may block the flow of enzymes along the pancreatic ducts [2-3].

The most common cause of chronic pancreatitis is many years of heavy alcohol use. Approximately 70 percent of cases are linked to alcohol consumption. Other causes of chronic pancreatitis are: hereditary disorders of the pancreas, cystic fibrosis—the most common inherited disorder leading to chronic pancreatitis, hypercalcemia high levels of calcium in the blood, hyperlipidemia or hypertriglyceridemia—high levels of blood fats, some medicines, certain autoimmune conditions and unknown causes [3]

1.1 Literature Review

So far only two bibliometric studies have published in the area of pancreas research. The first study focuses on

Indian pancreas research output comprising of 3858 papers [4] and the second study focuses on Indian acute pancreatitis research output comprising of 581 papers [5]. Both the studies used Scopus database and covered the period 2007-16. In both the studies, emphasis was on studying the growth rate, global share, citation impact, international collaborative papers share, distribution of publications by broad subjects, productivity and citation profile of top organizations and authors, preferred media of communication and characteristics of high cited papers

2. Objectives

The present manuscript aims to study the various dimensions of India's chronic pancreatitis research in terms of various bibliometric indicators, using Scopus international database during 2007-16. In particular, the study analyzed overall annual and cumulative growth of Indian publications, its global share among top 10 most productive countries, its citation impact, its international collaborative papers share, the publication output distribution by broad sub-fields, the productivity and citation impact of most productive organizations and authors, leading media of communications and characteristics of its top highly cited papers.

3. Methodology

The Indian chronic pancreatitis publication data during 2007-16 was retrieved and downloaded from the Scopus database for the present study. For deriving publication data, a main search strategy was formulated, where the keyword such as "chrnic pancreatitis" is searched in the "keyword tag" or "Article Title Tag" or "Source Title tag" and further limited the search output to period '2007-16' within "date range tag". This search strategy

generated 7734 global publications on chronic pancreatitis from the Scopus database. This main search strategy was later refined by ‘Country Name Tag’ to get chronic pancreatitis research output of individual top 10 most productive countries, including India one by one. Detailed analysis was carried out on 424 Indian publications using the analytical provisions or tags existing in Scopus database such as ‘subject area tag’, ‘country tag’, ‘source title tag’, ‘journal title name’ and ‘affiliation tag’, to get data distribution by subject, collaborating countries, author-wise, organization-wise and journal-wise, etc. For citation data, citations to publications were also collected from date of publication till 3 October 2017. A series of raw and relative bibliometric indicators were used by authors to understand the dynamics of India’s chronic pancreatitis research from different perspective

(KEY(chronic pancreatitis* or pancreatitis, chronic) OR TITLE(chronic pancreatitis* or pancreatitis, chronic) OR SRCTITLE("chronic pancreatitis*")) AND PUBYEAR > 2006 AND PUBYEAR < 2017 AND (LIMIT-TO (AFFILCOUNTRY,"India"))

4. Analysis

The global and Indian research output in chronic pancreatitis research cumulated to 7734 and 424 publications in 10 years during 2007-16 and they registered from 765 and 27 publications in the year 2007 to 762 and 46 publications in the year 2016, registering 0.33% and 8.73% growth per annum. Their five-year cumulative output increased from 3699 and 166 to 4035 and 258 publications from 2007-11 to 2012-16, registering 9.08% and 55.42% growth respectively. The share of Indian publications in global output was 5.48% during 2007-16, which increased from 4.49% to 6.39% from 2007-11 to 2012-16. Amongst Indian publications on chronic pancreatitis, 68.40% (290) was published as articles, 11.08% (47) as reviews, 10.14% (43) as letters, 4.25% (18) as notes, 2.36% (10) as editorials, 1.42% (6 each) as book chapters and conference papers, 0.47% (2) as articles in press and 0.24% (1 each) as book and short survey. The research impact as measured by citations per paper registered by global and Indian publications in chronic pancreatitis averaged to 16.52 and 11.06 citations per publication (CPP) during 2007-16; five-yearly impact averaged to 23.17 and 18.89 CPP for the period 2007-11 which declined to 10.42 and 6.03 CPP in the succeeding five-year 2012-16 (Table 1).

Publication Period	World			India					
	TP	TC	CPP	TP	TC	CPP	ICP	%ICP	%TP
2007	765	22561	29.49	27	605	22.41	3	11.11	3.53
2008	675	11731	17.38	31	608	19.61	6	19.35	4.59
2009	774	17564	22.69	39	1058	27.13	5	12.82	5.04
2010	749	17188	22.95	29	260	8.97	5	17.24	3.87
2011	736	16661	22.64	40	604	15.10	7	17.50	5.43
2012	778	13842	17.79	52	480	9.23	6	11.54	6.68
2013	875	14265	16.30	55	518	9.42	6	10.91	6.29
2014	800	6491	8.11	46	243	5.28	7	15.22	5.75
2015	820	4351	5.31	59	201	3.41	7	11.86	7.20

2016	762	3108	4.08	46	114	2.48	6	13.04	6.04
2007-11	3699	85705	23.17	166	3135	18.89	26	15.66	4.49
2012-16	4035	42057	10.42	258	1556	6.03	32	12.40	6.39
2007-16	7734	127762	16.52	424	4691	11.06	58	13.68	5.48
TP=Total Papers; TC=Total Citations; CPP=Citations Per Paper; ICP=International Collaborative Papers									

Table 1: World and India’s Output in Chronic Pancreatic Research, 2007-16

4.1 Publication Profile of Top 10 Most Productive Countries

As many as 50 countries in the world participated in global research in chronic pancreatitis during 2007-16. Between 189 and 2452 publications were contributed by top 10 most productive countries in chronic pancreatitis research and they together accounted for 84.28% of global publication share and more than 100% of global citation share during 2007-16. Their five-year publications output increased from 81.97% to 86.39% from 2007-11 to 2012-16. Each of top 10 countries had global publication share between 2.44% and 31.70% during 2007-16. USA accounted for the highest publication share (31.70%), followed by Germany

(10.68%), Japan (8.25%), U.K. and China (6.34% and 6.17%), Italy and India (5.95% and 5.48%), France and Spain (3.81% and 3.45%) and Poland (2.44%) during 2007-16. Their five-year global publication share have increased by 3.95% in China, followed by India (1.91%), USA (0.76%), U.K. (0.64%), France (0.52%), Italy (0.41%) and Spain (0.35%), as against decline by 2.38% in Germany, 1.34% in Japan and 0.39% in Poland from 2007-11 to 2012-16. France tops the list with 8.14% share in high cited papers, followed by Italy (7.61%), U.K.(6.33%), USA (5.26%), Germany (5.21%), etc. In terms of relative citation index (RCI), Five of top 10 countries scored above the world average i.e. more than 1.26: France (2.26), U.K. (2.06), Italy (1.88), Spain (1.80) and Germany (1.68) during 2007-16 (Table 2).

S.No	Country Name	TP			%TP			TC	CPP	ICP	%ICP	HCP	%HCP	RCI
		2007-11	2012-16	2007-16	2007-11	2012-16	2007-16							
1	USA	1158	1294	2452	31.31	32.07	31.70	43496	17.74	533	21.74	129	5.26	1.07
2	Germany	441	385	826	11.92	9.54	10.68	22866	27.68	313	37.89	43	5.21	1.68
3	Japan	331	307	638	8.95	7.61	8.25	11097	17.39	87	13.64	17	2.66	1.05
4	U.K.	222	268	490	6.00	6.64	6.34	16695	34.07	184	37.55	31	6.33	2.06

5	China	152	325	477	4.11	8.05	6.17	5719	11.9	84	17.61	5	1.05	0.7
									9					3
6	Italy	212	248	460	5.73	6.15	5.95	14275	31.0	153	33.26	35	7.61	1.8
									3					8
7	India	166	258	424	4.49	6.39	5.48	4691	11.0	58	13.68	9	2.12	0.6
									6					7
8	France	131	164	295	3.54	4.06	3.81	10990	37.2	105	35.59	24	8.14	2.2
									5					6
9	Spain	121	146	267	3.27	3.62	3.45	7926	29.6	79	29.59	7	2.62	1.8
									9					0
10	Poland	98	91	189	2.65	2.26	2.44	3169	16.7	56	29.63	4	2.12	1.0
									7					1
	Total	3032	3486	6518	81.9	86.3	84.2	14092	21.6	165	25.35	304	4.66	1.3
					7	9	8	4	2	2				1
	World	3699	4035	7734				12776	16.5					
								2	2					
	Share of Top 10 in World Output	81.9 7	86.3 9	84.2 8										

TP=Total Papers; TC=Total Citations; CPP=Citations Per Paper; ICP=International Collaborative Papers; HCP=High Cited Papers; RCI=Relative Citation Index

Table 2: Global Publication, Citation and International Collaboration Output of Top 10 Countries in Chronic Pancreatitis Research during 2007-16.

4.2 India's International Collaboration

The share of India's international collaborative publications (ICP) in its national output in chronic pancreatitis research was 13.68% during 2007-16, which decreased from 15.66% during 2007-11 to 12.40% during 2012-16. About 38 foreign countries collaborated with India in 58 chronic pancreatitis research papers during 2007-16. These 58 papers together registered 2027 citations, with 34.94 citations per paper. USA, among foreign countries, contributed the largest share

(48.28%) to India's international collaborative papers in chronic pancreatitis research, followed by Germany (24.14%), Japan (22.41%), France (17.24%), Italy and Netherlands (12.07% each), U.K. (10.34%), Canada, China and Sweden (8.62% each) during 2007-16. The share of ICP increased by 31.73% in USA, followed by Canada (15.63%), China (8.65%), Italy (7.93%) and France (3.37%), as against decrease by 12.02% in Germany, Netherlands (6.01%), Sweden (5.29%), U.K. (2.16%) and Japan (1.20%) from 2007-11 to 2012-16 (Table 3).

S.No.	Collaborative Country	Number of International Collaborative Papers			Share of International Collaborative Papers		
		2007-11	2012-16	2007-16	2007-11	2012-16	2007-16
1	USA	8	20	28	30.77	62.50	48.28
2	Germany	8	6	14	30.77	18.75	24.14
3	Japan	6	7	13	23.08	21.88	22.41
4	France	4	6	10	15.38	18.75	17.24
5	Italy	2	5	7	7.69	15.63	12.07
6	Netherlands	4	3	7	15.38	9.38	12.07
7	U.K.	3	3	6	11.54	9.38	10.34
8	Canada	0	5	5	0.00	15.63	8.62
9	China	1	4	5	3.85	12.50	8.62
10	Sweden	3	2	5	11.54	6.25	8.62
	Total	26	32	58			

Table 3: The Share of Top Foreign Countries in India's International Collaborative Papers in India's Chronic Pancreatitis research during 2007-16

4.3 Subject-Wise Distribution of Indian Research Output

As per the Scopus database classification, India's chronic pancreatitis research output is distributed across three-fields during 2007-16. Among sub-fields, medicine registered the highest publications share (92.45%), followed by biochemistry, genetics & molecular biology (27.83%) and pharmacology, toxicology & pharmaceuticals (2.83%) during 2007-16. The publication

activity, as seen through activity index from 2007-11 to 2012-16, witnessed decrease in medicine (from 102.95 to 98.10), biochemistry, genetics & molecular biology (from 106.06 to 96.10) and pharmacology, toxicology & pharmaceuticals (from 106.43 to 95.87) from 2007-11 to 2012-16. In terms of citation impact per paper, pharmacology, toxicology & pharmaceutical, among sub-fields, registered the highest CPP of 31.75, followed by biochemistry, genetics & molecular biology (16.16) and medicine (10.46) during 2007-16 (Table 4).

S.No	Subject*	Number of Papers (TP)			Activity Index		TC	CPP	%TP
		2007-11	2012-16	2007-16	2007-11	2012-16	2007-16	2007-16	2007-16
1	Medicine	158	234	392	102.95	98.10	4101	10.46	92.45
2	Biochemistry, Genetics & Molecular Biology	49	69	118	106.06	96.10	1907	16.16	27.83

3	Pharmacology, Toxicology & Pharmaceutics	5	7	12	106.43	95.87	381	31.75	2.83
	Indian Output	166	258	424					
<ul style="list-style-type: none"> There is overlapping of literature covered under various subjects 									
TP=Total Papers; TC=Total Citations; CPP=Citations Per Paper									

Table 4: Subject-Wise Breakup of Indian Publications in Chronic Pancreatitis Research during 2007-16

4.4 Significant Keywords

Around 39 significant keywords have been identified from the literature, which throws light on the possible

trends of research in this field. These keywords are listed in Table 5 in the decreasing order of the frequency of occurrence during 2007-16.

S.No	Keywords	Frequency	S.No	Keywords	Frequency
1	Chronic pancreatitis	363	21	Pancreas cancer	30
2	Pancreatitis	128	22	Endosonography	29
3	Computer-assisted tomography	106	23	Genetics	25
4	Abdominal pain	103	24	Pancreatic pseudocyst	24
5	Diabetes mellitus	73	25	Pancreaticoduodenectomy	24
6	Acute pancreatitis	69	26	Epigastric pain	23
7	Endoscopic echography	47	27	Oxidative stress	23
8	Pancreas	46	28	Antioxidants	22
9	Histopathology	39	29	Pancreas enzymes	22
10	Pancreas pseudocyst	38	30	Pancreas tumor	22
11	Pancreas ducts	38	31	Cystic fibrosis	21
12	Pancreas neoplasm	37	32	Tropical calcific pancreatitis	20
13	Pseudocyst	36			
14	Stent	35	33	Endoscopic sphincterotomy	19
15	Pancreas disease	34	34	Hypertension	19
16	Endoscopic retrograde cholangiopancreatography	33	35	Pancreas divisum	19
17	Pancreas calcification	33	36	Pathogenesis	19
18	Alcohol consumption	31	37	Pancreas resection	18
19	Magnetic resonance cholangiopancreatography	31	38	Prognosis	17
20	Alcohol pancreatitis	30	39	Endoscopic ultrasonography	15

Table 5: List of Significant Keywords in Indian Chronic Pancreatitis Literature, 2007-16

4.5 Profile of Top 20 Most Productive Indian Organizations

207 organizations participated in Indian chronic pancreatic research, of which 199 organizations contributed 1-10 papers each, 5 organizations each 11-27 papers and 3 organizations each 31-66 papers. The top 20 Indian organizations contribution to chronic pancreatitis research varied from 6 to 66 publications and they together accounted for 80.42% (341) publication share and more than 100% (4741) citation share to its cumulative publications output during 2007-16. Table 6 presents a scientometric profile of these 20 India organizations.

- Six organizations registered higher productivity than the group average of 17.05: PGIMER-Chandigarh (66 papers), Asian Institute of Gastroenterology, Hyderabad (46 papers), AIIMS-New Delhi (31 papers), Amrita Institute of Medical Sciences, Coimbatore (27 papers), SGPGIMS- Lucknow (27 papers), CMC- Vellore(21 papers) during 2007-16.
- Eight organizations registered higher citation impact than group average of 13.90 citations per publication: Manipal University (28.33), SGPGIMS- Lucknow (24.11), SCB Medical College & Hospital, Orissa (21.33), Asian Institute of Gastroenterology, Hyderabad (20.57),CCMB- yderabad (19.380,

Maulana Azad Medical College, New Delhi (18.44), AIIMS- New Delhi (18.42) and Institute of Liver & Biliary Sciences, New Delhi (15.80) during 2007-16.

- Seven organizations registered higher h-index than group average of 6.25: Asian Institute of Gastroenterology, Hyderabad (16), PGIMER-Chandigarh (12), SGPGIMS- Lucknow AND aiims-New Delhi (11 each), Amrita Institute of Medical Sciences, Coimbatore (10), CCMB-Hyderabad and CMC-Vellore (8 each) during 2007-16.
- Eight organizations achieved higher international collaborative publications share than group average of 16.13%: CCMB-Hyderabad (61.54%0, CMC-Vellore (28.57%), SGPGIMS-Lucknow and Stanley Medical College, Chennai (22.22% each), Asian Institute of Gastroenterology, Hyderabad (21.74%0, Institute of Liver & Biliary Sciences, New Delhi (20.0%), Osmania General Hospital, Hyderabad and Manipal University (16.67% each) during 2007-16.
- Eight organizations registered higher relative citation index than group average (01.26): Manipal University(2.56), SGPGIMS- Lucknow (2.18), SCB Medical College & Hospital, Orissa(1.93), Asian Institute of Gastroenterology, Hyderabad (1.86), CCMB-Hyderabad (1.75), Maulana Azad Medical College, New Delhi (1.67), AIIMS-New Delhi (1.67) and Institute of Liver & Biliary Sciences, New Delhi (1.43) during 2007-16.

S.No	Name of the Organization	TP	TC	CPP	HI	ICP	%ICP	RCI
1	Postgraduate Institute of Medical Education & Research (PGIMER), Chandigarh	66	537	8.14	12	8	12.12	0.74
2	Asian Institute of Gastroenterology, Hyderabad	46	946	20.57	16	10	21.74	1.86

3	All India Institute of Medical Sciences (AIIMS), New Delhi	31	571	18.42	11	4	12.90	1.67
4	Amrita Institute of Medical Sciences, Coimbatore	27	305	11.30	10	3	11.11	1.02
5	Sanjay Gandhi Postgraduate Institute of Medical Sciences (SGPGIMS), Lucknow	27	651	24.11	11	6	22.22	2.18
6	Christian Medical College (CMC), Vellore	21	203	9.67	8	6	28.57	0.87
7	Centre for Cellular & Molecular Biology (CCMB), Hyderabad	13	252	19.38	8	8	61.54	1.75
8	Kasturba Medical College (KMC), Manipal	11	125	11.36	4	1	9.09	1.03
9	Asian Healthcare Foundation, Hyderabad	10	78	7.80	5	0	0.00	0.71
10	G.B.Pant Hospital, Delhi	10	93	9.30	5	0	0.00	0.84
11	Institute of Post Graduate Medical Education & Research (IPGMER), Kolkata	10	11	1.10	2	0	0.00	0.10
12	Institute of Liver & Biliary Sciences, New Delhi	10	158	15.80	6	2	20.00	1.43
13	Maulana Azad Medical College, New Delhi	9	166	18.44	5	1	11.11	1.67
14	Stanley Medical College, Chennai	9	103	11.44	3	2	22.22	1.03
15	Osmania University, Hyderabad	8	43	5.38	5	0	0.00	0.49
16	Medical College, THiruvanathapuram	8	85	10.63	2	1	12.50	0.96
17	Madras Diabetic Research Foundation, Chennai	7	69	9.86	3	1	14.29	0.89
18	Manipal University	6	170	28.33	3	1	16.67	2.56
19	SCB Medical College & Hospital, Orissa	6	128	21.33	2	0	0.00	1.93
20	Osmania General Hospital, Hyderabad	6	47	7.83	4	1	16.67	0.71
	Total of 15 organizations	341	4741	13.90	6.25	55	16.13	1.26
	Total of India	424	4691	11.06				

Share of top 15 organizations in Indian total output	80.42							
TP=Total Papers; TC=Total Citations; CPP=Citations Per Paper; HI=h-index; ICP=International Collaborative Papers; RCI=Relative Citation Index								

Table 6: Scientometric Profile of Top 20 Most Productive Indian Organizations in Chronic Pancreatitis Research during 2007-16

4.6 Profile of Top 20 Most Productive Authors

368 authors participated in Indian chronic pancreatic research, of which 351 authors contributed 1-10 papers each, 13 authors each 11-20 papers, 2 authors each 21-30 papers and 2 authors each 31-40 papers. The top 20 Indian author’s contribution to chronic pancreatitis research varied from 9 to 43 publications and they together accounted for 81.84% (347) publication share and more than 100% (5085) citation share to its cumulative publications output during 2007-16. Table 7 presents a scientometric profile of these 20 India authors.

- Six authors registered higher publications productivity than group average of 17.35: D.K.Bhasin(43 papers), S.S. Rana (39 papers), D.N. Reddy (33 papers), R. Gupta (23 papers), V.Balakrishnan (21 papers) and K. Singh (20 papers) during 2007-16.
- Seven authors registered higher citation impact than the group average of 14.65 citations per publication:

P.K. Garg (47.07), G. Chaudhuri (45.5%), S. Lakhtakia (31.92), G.V Rao (26.31), G.R. Chandok (20.5%), D.N. Reddy (19.33) and S.Bhaskar (17.73) during 2007-16.

- Nine authors registered higher h-index than group average of 7.75: P.K. Garg (13), D.N. Reddy (12), G.V Rao, R. Gupta, D.K.Bhasin and S.S. Rana (10 each), G.R. Chandok, V.Balakrishnan and K. Singh (8 each) during 2007-16.
- Seven authors achieved higher international collaborative publications share than the group average of 13.83% of all authors: S.Bhaskar (63.64%), G.R. Chandok (58.33%), G. Chaudhuri (40.0%), A.Chacko (33.33%), P.K. Garg (21.43%), D.N. Reddy (21.21%) and S. Lakhtakia (16.67%) during 2007-16.
- Seven authors registered higher relative citation index than the group average of 1.32: P.K. Garg (4.26), G. Chaudhuri (4.11), S. Lakhtakia (2.89), G.V Rao (2.38), G.R. Chandok (1.85), D.N. Reddy (1.75) and S. Bhaskar (1.60%) during 2007-16.

S.No.	Name of the Author	Affiliation of the Author	TP	TC	CPP	HI	ICP	%ICP	RCI
1	D.K.Bhasin	PGIMER-Chandigarh	43	359	8.35	10	3	6.98	0.75
2	S.S. Rana	PGIMER-Chandigarh	39	307	7.87	10	4	10.26	0.71
3	D.N. Reddy	Asian Institute of Gastroenertology, Hyderabad	33	638	19.33	12	7	21.21	1.75

S.No.	Name of the Author	Affiliation of the Author	TP	TC	CPP	HI	ICP	%ICP	RCI
4	R. Gupta	Asian Institute of Gastroenertology, Hyderabad	23	282	12.26	10	1	4.35	1.11
5	V.Balakrishnan	Amrita Institute of Medical Sciences, Coimbatore	21	265	12.62	8	2	9.52	1.14
6	K. Singh	PGIMER-Chandigarh	20	150	7.50	8	1	5.00	0.68
7	R. Talukdar	Pushpawati Singhanian Research Center, New Delhi	17	186	10.94	7	1	5.88	0.99
8	R. Rajesh	Amrita Institute of Medical Sciences, Coimbatore	14	93	6.64	7	0	0.00	0.60
9	P.K. Garg	AIIMS- New Delhi	14	659	47.07	13	3	21.43	4.26
10	G.V Rao	Asian Institute of Gastroenertology, Hyderabad	13	342	26.31	10	1	7.69	2.38
11	S.K. Sinha	PGIMER-Chandigarh	13	114	8.77	7	1	7.69	0.79
12	G.R. Chandok	CCMB-Hyderabad	12	246	20.50	8	7	58.33	1.85
13	S. Lakhtakia	Asian Institute of Gastroenertology, Hyderabad	12	383	31.92	7	2	16.67	2.89
14	V.Sharma	PGIMER-Chandigarh	12	34	2.83	4	0	0.00	0.26
15	S.Bhaskar	CCMB-Hyderabad	11	195	17.73	7	7	63.64	1.60
16	B. Negi	PGIMER-Chandigarh	11	125	11.36	7	1	9.09	1.03
17	G. Chaudhuri	SGPGIMS- Lucknow	10	455	45.50	6	4	40.00	4.11
18	B.N. Girish	Amrita Institute of Medical Sciences, Coimbatore	10	68	6.80	5	0	0.00	0.61
19	K.Vaidyanathan	Amrita Institute of Medical Sciences, Coimbatore	10	68	6.80	5	0	0.00	0.61
20	A.Chacko	CMC-Vellore	9	116	12.89	4	3	33.33	1.17
		Total of 20 authors	347	5085	14.65	7.75	48	13.83	1.32
		Total of India	424	4691	11.06				
		Share of top 20 authors in Indian total output	81.84						

TP=Total Papers; TC=Total Citations; CPP=Citations Per Paper; HI=h-index; ICP=International Collaborative Papers; RCI=Relative Citation Index

Table 7: Scientometric Profile of Top 20 Most Productive Authors in Chronic Pancreatitis Research during 2007-16

4.7 Medium of Communication

157 journals contributed to Indian chronic pancreatic research, of which 151 journals contributed 1-10 papers each, 4 journals each 11-20 papers and 2 journals 31-40 papers each. Among India's chronic pancreatitis 415 papers in journals (constituting 97.88% of total Indian output), the top 15 most productive journals accounted for 6 to 37 papers. These 15 journals together accounted for 49.67% share (206 papers) of total Indian journal

publication output during 2007-16, decreasing from 55.56% during 2007-11 to 45.84% during 2012-16. *Indian Journal of Gastroenterology* and *Journal of the Pancreas* were the most productive journals each with 37 and 34 papers each, followed by *Pancreas* (18 papers), *Gastrointestinal Endoscopy* and *Journal of Gastroenterology & Hepatology Australia* (16 papers each), etc. during 2007-16 (Table 8).

S.No	Name of the Journal	Number of Papers		
		2007-11	2012-16	2007-16
1	Indian Journal of Gastroenterology	17	20	37
2	Journal of the Pancreas	19	15	34
3	Pancreas	12	6	18
4	Gastrointestinal Endoscopy	4	12	16
5	Journal of Gastroenterology & Hepatology Australia	11	5	16
6	Pancreatology	2	11	13
7	BMJ Case Reports	1	8	9
8	Gut	7	2	9
9	Indian Journal of Surgery	1	8	9
10	World Journal of Gastroenterology	5	4	9
11	Clinical Gastroenterology & Hepatology	6	2	8
12	Gastroenterology	3	5	8
13	Annals of Gastroenterology	0	7	7
14	Endoscopic Ultrasound	0	7	7
15	Endoscopy	2	4	6
	Total of 14 journals	90	116	206
	Total Indian journal output	162	253	415
	Share of top 14 journals in Indian journal output	55.56	45.85	49.64

Table 8: Productivity of Top 15 Most Productive Journals in Indian Chronic Pancreatitis Research during 2007-16

4.8 Characteristics of Highly Cited Papers

Nine papers were identified which have received 112 to 268 citations and are assumed as high cited papers. These 9 papers received together registered 1414 citations, which averaged to 157.11 citations per paper. Among foreign countries participating in high cited papers, USA contributed 4 papers, followed by Japan, Germany and Netherland (3 papers each), Sweden (2 papers) and Belgium, Canada, Czech Republic, France, Hungary, Italy, South Korea, Spain, Switzerland, Taiwan and U.K. (1 paper each). Amongst 9 high cited papers, 2 were reviews and 7 articles. Among 9 high cited papers, 3 received zero collaboration, 6 international collaborative) and involve the participation of 119 authors and 66 organizations (9 Indian). The 9 Indian organizations include 2 papers from Asian Institute of Gastroenterology, Hyderabad, and one paper each from All India Institute of Medical Sciences, New Delhi, Institute of Bioinformatics, Bangalore, Institute of Liver & Biliary Sciences, New Delhi, Manipal University, National Institute of Pharmaceutical Education & Research, Mohali, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow and University of Delhi. The 9 highly cited papers were published in 9 journals, with 1 paper each in *Current Problems in Cancer*, *Endoscopy*, *Gastroenterology*, *Journal of American College of Surgeons*, *Journal of Gastroenterology*, *Medicinal Research Review*, *Nature Genetics*, *Pancreas* and *PLOS Medicine*.

5. Summary & Conclusion

424 Indian publications chronic pancreatitis research, as indexed in Scopus database, was published during 2007-16 and they increased from

27 to 46 in the year 2007 to the year 2016, registering 8.73% growth per annum. Their cumulative Indian output increased from 166 to 258, witnessing 55.42% growth from 2007-11 to 2012-16. India's global publication share in chronic pancreatitis research was only 5.48% during 2007-16, witnessing increase from 4.49% to 6.39% from 2007-11 to 2012-16. The citation impact per paper of Indian publications on chronic pancreatitis research was averaged to 11.06 citations, however, decreasing from 18.89 during 2006-11 to 6.03 during 2012-16. The share of India's international collaborative publications in chronic pancreatitis research was 13.68% during 2007-16, showing decrease from 15.66% during 2007-11 to 12.40% during 2012-16. USA in India's international collaborative papers, contributed the largest publications share of 48.28%, followed by Germany (24.14%), Japan (22.41%), France (17.24%), Italy and Netherlands (12.07% each), U.K. (10.34%), Canada, China and Sweden (8.62% each) during 2007-16.

Medicine, among sub-fields contributed the highest publications share (92.45%), followed by biochemistry, genetics & molecular biology (27.83%), pharmacology, toxicology & pharmaceuticals (2.83%) and immunology & microbiology (3.61%) during 2007-16. The research activities, as reflected in activity index, showed decrease in medicine, biochemistry, genetics & molecular biology and pharmacology, toxicology & pharmaceutical from 2007-11 to 2012-16.

Among leading organizations and authors participating in India's acute pancreatitis research, the 20 most productive Indian organizations and

authors together contributed 80.42% and 81.84% respectively as their share of Indian publication output and more than 100% each respectively as their share of Indian citation output during 2007-16. The leading organizations in research productivity were: PGIMER-Chandigarh (66 papers), Asian Institute of Gastroenterology, Hyderabad (46 papers), AIIMS-New Delhi (31 papers), Amrita Institute of Medical Sciences, Coimbatore (27 papers), SGPGIMS- Lucknow (27 papers), CMC-Vellore(21 papers), etc. during 2007-16. The leading organizations registering comparatively higher citation impact were: Manipal University (28.33), SGPGIMS- Lucknow (24.11), SCB Medical College & Hospital, Orissa (21.33), Asian Institute of Gastroenterology, Hyderabad (20.57), CCMB- yderabad (19.380, Maulana Azad Medical College, New Delhi (18.44), AIIMS- New Delhi (18.42), Institute of Liver & Biliary Sciences, New Delhi (15.80) etc. during 2007-2016.

The leading authors in publication productivity were: D.K.Bhasin(43 papers), S.S. Rana (39 papers), D.N. Reddy (33 papers), R. Gupta (23 papers), V.Balakrishnan (21 papers) and K. Singh (20 papers) during 2007-16. The leading authors in terms of research impact were: P.K. Garg (47.07), G. Chaudhuri (45.5%), S. Lakhtakia (31.92), G.V Rao (26.31), G.R. Chandok (20.5%), D.N. Reddy (19.33) and S.Bhaskar (17.73) during 2007-16.

Among the total journal output of 415 papers; the top 15 most productive journals contributed 49.67% share of total journal publication output during 2007-16, which decreased from 55.56% to 45.84% from 2007-11 and 2012-16. *Indian Journal of Gastroenterology and Journal of the Pancreas*

were the most productive journals each with 37 and 34 papers each, followed by Pancreas (18 papers), Gastrointestinal Endoscopy and Journal of Gastroenterology & Hepatology Australia (16 papers each), etc. during 2007-16.

The 9 highly cited publications individually received citations varying from 112 to 268 in chronic pancreatitis research and together these papers received 1414 citations, with 157.11 citations per paper. Around 119 authors and 66 organizations (9 Indian) participated in these 9 high cited papers and were published in 9 journals, *with 1 paper each in in Current Problems in Cancer, Endoscopy, Gastroenterology, Journal of Americal College of Surgeons, Journal of Gastroenterology, Medicinal Research Review, Nature Genetics , Pancreas and PLOS Medicine.*

Concludes that pancreas disorders research have received negligible attention during the last 20 years. As a result, Indian policy makers need to recognize pancrease disorder research as notified disease and allocate sufficient resources and build proper infrastructure for screening, identification, monitoring and treatment of patients in pancreas disorders.

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